

WHAT IS CLAIMED IS

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1. An optical scanning device comprising

a light source emitting a light beam based on a pixel clock;

10 a scanning optical system scanning an image surface in a main scanning direction by focusing a deflected light beam, derived from the light beam of the light source, onto the image surface as a beam spot, the scanning optical system providing an amount of linearity at an outer peripheral end of the image surface;

an optical writing unit controlling ON/OFF state of the light source in accordance with an image signal;

15 a frequency dividing unit, connected to the optical writing unit, generating a secondary frequency of the pixel clock at an output thereof, which is equal to an initial frequency of the pixel clock at an input thereof divided by a divisor integer; and

20 an electrical correction unit adjusting the secondary frequency of the pixel clock at the output of the frequency dividing unit with respect to each of respective pixels included in the image signal, when the beam spot is located near the outer peripheral end of the image surface, so as to obtain uniform-velocity characteristics.

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2. The optical scanning device according to claim 1, wherein the scanning optical system is configured to satisfy the conditions  $0.5 \% \leq |Lin| \leq 10 \%$  where Lin indicates the amount of the linearity.

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3. The optical scanning device according to claim 1, wherein the scanning optical system includes a scanning lens device having lens surfaces that are concentric with respect to a reflection point of a rotary deflector, and the number of the concentric lens surfaces in the scanning lens device is either equal to or larger than the number of non-concentric lens surfaces in the scanning lens device.

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4. The optical scanning device according to claim 3, wherein the scanning lens device comprises a first scanning lens located near the rotary deflector and a second scanning lens located near the image surface, each of the first and second scanning lenses being a positive lens, the first scanning lens having a refractive lens power larger than a refractive lens power of the second scanning lens.

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5. The optical scanning device according to claim 3, wherein at least one of the lens surfaces included in the scanning lens device is formed into a high-order aspherical shape in a main-scanning cross-section thereof.

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6. An optical scanning device comprising:

10 light source means for emitting a light beam based on a pixel clock;

scanning optical system means for scanning an image surface in a main scanning direction by focusing a deflected light beam, derived from the light beam of the light source means, onto the image surface as a beam spot, the scanning optical system means providing an amount of linearity at an outer peripheral end of the image surface;

optical writing means for controlling ON/OFF state of the light source means in accordance with an image signal;

20 frequency dividing means, connected to the optical writing means, for generating a secondary frequency of the pixel clock at an output thereof, which is equal to an initial frequency of the pixel clock at an input thereof divided by a divisor integer; and

electrical correction means for adjusting the secondary frequency of the pixel clock at the output of the frequency dividing

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means with respect to each of respective pixels included in the image signal, when the beam spot is located near the outer peripheral end of the image surface, so as to obtain uniform-velocity characteristics.

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7. An image forming system in which an optical scanning  
10 device and an image forming device are provided, the image forming device forming a latent image on an image surface of a photoconductor by using a beam spot created by the optical scanning device, the optical scanning device comprising:

a light source emitting a light beam based on a pixel clock;  
15 a scanning optical system scanning the image surface in a main scanning direction by focusing a deflected light beam, derived from the light beam of the light source, onto the image surface as the beam spot, the scanning optical system providing an amount of linearity at an outer peripheral end of the image surface;

20 an optical writing unit controlling ON/OFF state of the light source in accordance with an image signal;

a frequency dividing unit connected to the optical writing unit and generating a secondary frequency of the pixel clock at an output thereof, which is equal to an initial frequency of the pixel clock at  
25 an input thereof divided by a divisor integer; and

an electrical correction unit adjusting the secondary frequency of the pixel clock at the output of the frequency dividing unit with respect to each of respective pixels included in the image signal, when the beam spot is located near the outer peripheral end of the image surface, so as to obtain uniform-velocity characteristics.

8. An optical scanning device comprising:
- a light source emitting a light beam based on a pixel clock;
  - a scanning optical system scanning an image surface in a main scanning direction by focusing a deflected light beam, derived from the light beam of the light source, onto the image surface as a beam spot, the scanning optical system providing a maximum amount of linearity  $L_m$  over the entire image surface at a maximum-linearity point of the image surface and an amount of linearity  $L_e$  at an outer peripheral end of the image surface, the scanning optical system being configured to satisfy the condition  $|L_m/L_e| > 1.0$ ;
  - an optical writing unit controlling ON/OFF state of the light source in accordance with an image signal;
  - a frequency dividing unit, connected to the optical writing unit, generating a secondary frequency of the pixel clock at an output thereof, which is equal to an initial frequency of the pixel clock at an input thereof divided by a divisor integer; and

an electrical correction unit adjusting the secondary frequency of the pixel clock at the output of the frequency dividing unit with respect to each of respective pixels included in the image signal, when the beam spot is located near one of the maximum-linearity point and the outer peripheral end of the image surface, so as to obtain uniform-velocity characteristics.

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9. The optical scanning device according to claim 8, wherein the scanning optical system is configured to provide the maximum amount of linearity  $L_m$  over the entire image surface that satisfies the conditions  $0.5 \% \leq |L_m| \leq 10 \%$ .

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10. The optical scanning device according to claim 8, wherein the scanning optical system is configured to provide the maximum amount of linearity  $L_m$  over the entire image surface and the amount of linearity  $L_e$  at the outer peripheral end of the image surface, which satisfy the conditions  $L_m > 0$  and  $|L_e| \leq 5 \%$ .

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11. The optical scanning device according to claim 8, wherein the scanning optical system includes a scanning lens device having lens surfaces that are concentric with respect to a reflection point of a rotary deflector, and the number of the concentric lens surfaces in the scanning lens device is either equal to or larger than the number of non-concentric lens surfaces in the scanning lens device.

12. The optical scanning device according to claim 11, wherein the scanning lens device comprises a first scanning lens located near the rotary deflector and a second scanning lens located near the image surface, each of the first and second scanning lenses being a positive lens, the first scanning lens having a refractive lens power larger than a refractive lens power of the second scanning lens.

13. The optical scanning device according to claim 11, wherein at least one of the lens surfaces included in the scanning lens device is configured to have a distribution of radius of curvature over lens height in which the radius of curvature is

gradually increased from a center of the lens height to an inflection point near an outer periphery of the lens height, and the radius of curvature is decreased from the inflection point to the outer periphery of the lens height.

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14. The optical scanning device according to claim 11,  
10 wherein at least one of scanning lenses included in the scanning lens device is configured to have a distribution of lens power over lens height in which the lens power is gradually decreased from a center of the lens height to an inflection point near an outer periphery of the lens height, and the lens power is increased from the inflection  
15 point to the outer periphery of the lens height.

20 15. The optical scanning device according to claim 11,  
wherein at least one of the lens surfaces included in the scanning lens device is formed into a high-order aspherical shape in a main-scanning cross-section thereof.

16. An optical scanning device comprising:  
25 light source means for emitting a light beam based on a pixel



clock;

scanning optical system means for scanning an image surface  
in a main scanning direction by focusing a deflected light beam,  
derived from the light beam of the light source means, onto the  
5 image surface as a beam spot, the scanning optical system means  
providing a maximum amount of linearity  $L_m$  over the entire image  
surface at a maximum-linearity point and an amount of linearity  $L_e$   
at an outer peripheral end of the image surface, the scanning optical  
system means being configured to satisfy the condition  $|L_m/L_e| >$   
10 1.0;

optical writing means for controlling ON/OFF state of the  
light source in accordance with an image signal;

frequency dividing means, connected to the optical writing  
means, for generating a secondary frequency of the pixel clock at an  
15 output thereof, which is equal to an initial frequency of the pixel  
clock at an input thereof divided by a divisor integer; and

electrical correction means for adjusting the secondary  
frequency of the pixel clock at the output of the frequency dividing  
means with respect to each of respective pixels included in the  
20 image signal, when the beam spot is located near one of the  
maximum-linearity point and the outer peripheral end of the image  
surface, so as to obtain uniform-velocity characteristics.

17. An image forming system in which an optical scanning device and an image forming device are provided, the image forming device forming a latent image on an image surface of a photoconductor by using a beam spot created by the optical scanning device, the optical scanning device comprising:

a light source emitting a light beam based on a pixel clock;

a scanning optical system scanning an image surface in a main scanning direction by focusing a deflected light beam, derived from the light beam of the light source, onto the image surface as a beam spot, the scanning optical system providing a maximum amount of linearity  $L_m$  over the entire image surface at a maximum-linearity point and an amount of linearity  $L_e$  at an outer peripheral end of the image surface, the scanning optical system being configured to satisfy the condition  $|L_m/L_e| > 1.0$ ;

an optical writing unit controlling ON/OFF state of the light source in accordance with an image signal;

a frequency dividing unit, connected to the optical writing unit, generating a secondary frequency of the pixel clock at an output thereof, which is equal to an initial frequency of the pixel clock at an input thereof divided by a divisor integer; and

an electrical correction unit adjusting the secondary frequency of the pixel clock at the output of the frequency dividing unit with respect to each of respective pixels included in the image signal, when the beam spot is located near one of the maximum-linearity point and the outer peripheral end of the image surface, so as to

obtain uniform-velocity characteristics.

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